A decision support system for sustainable forest management and ecosystem service provisioning at the enterprise scale

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73 NRP **Sustainable Economy**
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Background and aim of the project:

- Changes in climatic conditions and societal demands for ecosystem services (ES) make the **planning of sustainable forest management highly challenging**

- → Within the research project SessFor, a decision support system (DSS) for strategic planning at the forest enterprise level is developed

Fig. 1: Timber harvest in steep terrain. © J.Schweier, WSL

Material and methods:

- DSS based on **climate sensitive** forest model (Zell et al., 2020)
- Various indicators for **biodiversity** and **ES** considered (Fig. 2)
- First DSS application at case study 'Wagenrain' in plateau region of Switzerland
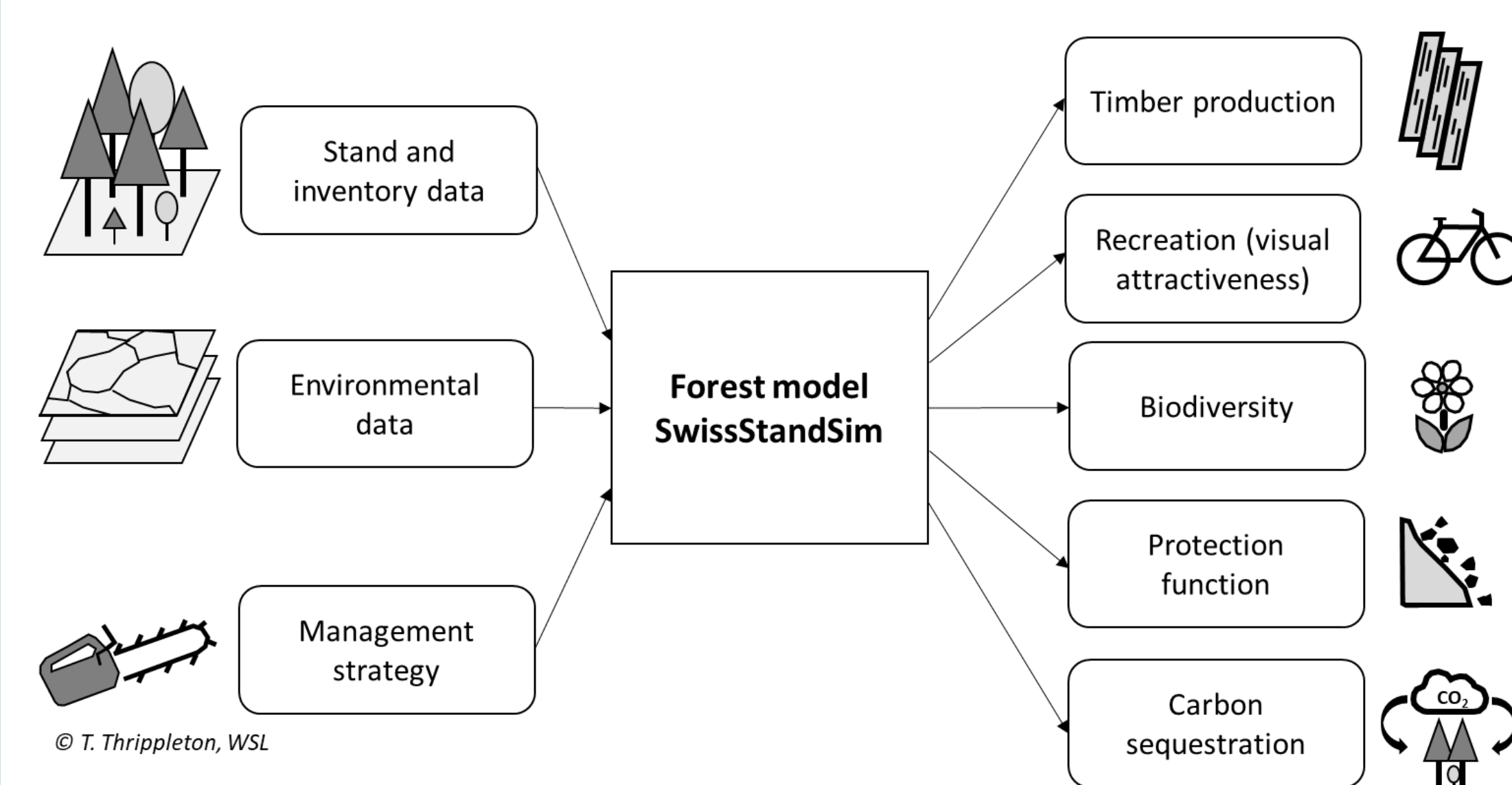- Further case studies in other regions ongoing

Fig. 2: Structure of decision support system, based on Blattert et al. (2018)

Preliminary results:

- Evaluation of 4 management strategies under present climate investigated for years 2010 to 2060
- →**Trade-offs** between carbon sequestration, timber production and biodiversity (Fig. 3)
- Decrease of recreation value over time under 'less intensive management' strategy (Fig. 4)
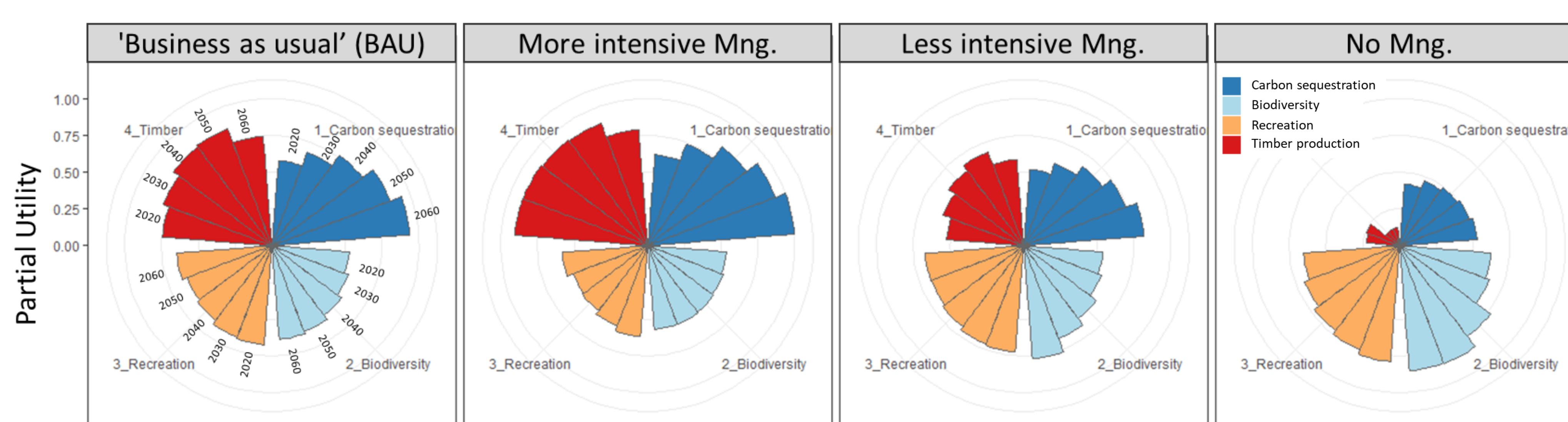

Fig. 3: Development of indicators for biodiversity and ecosystem services (carbon sequestration, timber production, recreation) for four alternative management strategies at the case-study enterprise Wagenrain in Switzerland. Note that different colours indicate different ecosystem services and indicators are expressed as normalized values (partial utilities) for comparability. Values range from 0 (lowest value) to 1 (optimum value), see Blattert et al. (2018)
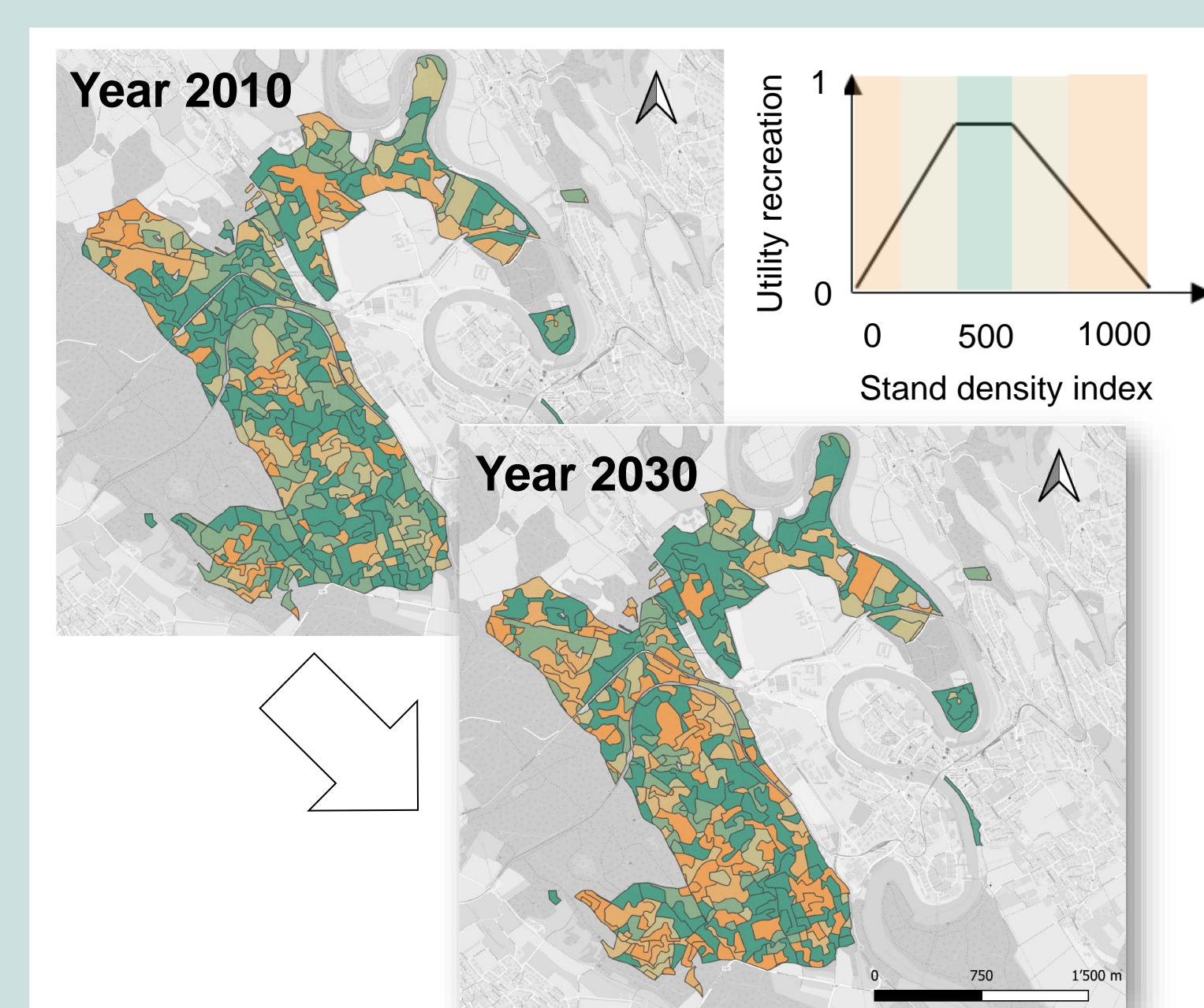

Fig. 4 Development of recreation value (stand density index indicating visual attractiveness, see Blattert et al., 2018) for 'Less intensive Mng.' strategy. Note that colours indicate recreation utility value (green: high, orange: low)

Outlook:

- Evaluation of different management strategies under climate change scenarios, using multi-criteria decision analysis
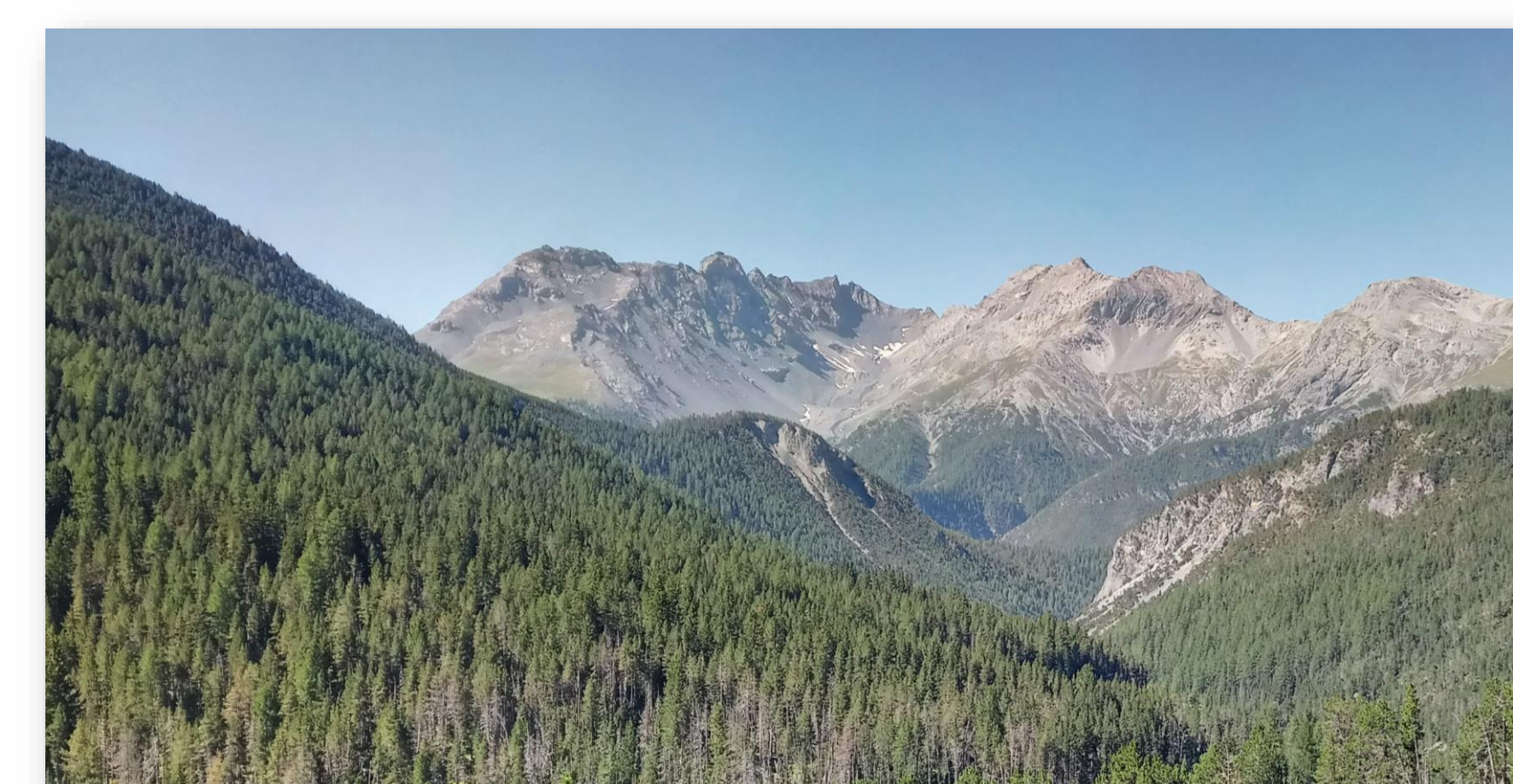- Inclusion of further case study enterprises in mountainous regions

Fig. 5: Mountain forests in Grisons, Switzerland © T. Thrippleton, WSL

References:

1: Zell, J.; Nitzsche, J.; Stadelmann, G.; Thürig, E. (2020): Swiss-StandSim: ein klimasensitives, einzelbaumbasiertes Waldwachstumsmodell. Schweizerische Zeitschrift für Forstwesen 171: 116–123

2: Blattert, C.; Lemm, R.; Thees, O.; Hansen, J.; Lexer, M.J.; Hanewinkel, M. (2018): Segregated versus integrated biodiversity conservation: Value-based ecosystem service assessment under varying forest management strategies in a Swiss case study. Ecological Indicators 95: 751–764